

CLAIMS

We claim:

1. A system for content adaptive encoding of video comprising:
 - an extractor that divides the video content into temporal portions;
 - a locator that associates descriptors to each portion based on portion content;
 - a mapper that maps each portion of the video content to a model from a plurality of models based on the portion descriptors; and
 - a plurality of encoders, each encoder of the plurality of encoders configured to encode portions according to the model associated with the portion.
2. The system of claim 1, further comprising:
 - a generic encoder included in the plurality of encoders, wherein portions not associated with any model from the plurality of models are encoded using the generic encoder.
3. The system of claim 1, wherein the locator further locates subsegments.
4. The system of claim 3, wherein the locator further locates regions of interest.
5. The system of claim 4, wherein the mapper further comprises:
 - a plurality of content model units, each content model unit of the plurality of content model units being associated with a model of the plurality of models;
 - a plurality of comparators, each comparator of the plurality of comparators connected to a content model unit and an output from the extractor or an output from the locator; and
 - a plurality of selectors, wherein each selector of the plurality of selectors is connected to two of the comparators.
6. The system of claim 5, wherein the plurality of content model units further comprises a generic content model unit.

1 7. The system of claim 6, wherein the mapper outputs from the selectors a signal
2 that controls a switch to route portions to one of the plurality of encoders.

1 8. A system for content adaptive encoding of video comprising:

2 an extractor that divides the video into temporal portions;

3 a locator that associates descriptors with each portion based on portion content;

4 a mapper that maps each portion of the video to a model chosen from a plurality
5 of models based on a comparison of the plurality of models to the descriptors associated
6 with each portion;

7 a buffer for storing the portions, the buffer having outputs connected to a
8 switch; and

9 a plurality of encoders, each encoder of the plurality of encoders connected to
10 the output of the switch and configured to encode segments according to the model
11 associated with the portion.

1 9. The system of claim 8, further comprising:

2 a generic encoder included in the plurality of encoders, the generic encoder
3 encoding portions not having an associated model.

1 10. A video extractor used for content adaptive encoding of video, the video
2 extractor comprising:

3 a video segment extractor receiving the video;

4 a plurality of characteristic extractors each receiving the video and outputting a
5 signal associated with an attribute of the video to an analyzer, the analyzer determining a
6 characteristic of the video;

7 a manual segment extraction module receiving the video and an output from the
8 analyzer, wherein the manual segment extraction module provides an output signal
9 associated with the video divided into temporal segments;

10 a plurality of memory units for storing segments; and

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11 a switch for routing video segments into the plurality of memory units for storing
12 segments.

1 11. The video extractor of claim 10, further comprising:

2 a header extractor for extracting header information from video.

1 12. The video extractor of claim 11, further comprising:

2 an interpreter receiving output from the analyzer for automatically determining
3 video segments.

1 13. The video extractor of claim 12, further comprising:

2 a switch connected to an output from the interpreter and the manual video
3 content extractor module, wherein manual or automatic segment extraction may be
4 output.

1 14. The video extractor of claim 10, wherein the plurality of characteristic video
2 content extractors comprises a shot concept extractor, a scene properties extractor, a
3 camera operation extractor, a special effects extractor and a textual transcript keyword
4 extractor.

1 15. The video extractor of claim 14, wherein the analyzer performs semantic and
2 statistical analysis on the video.

1 16. A video segment extractor comprising:

2 a human operated module for determining video segments from input video;

3 an automatic video segment determining module for automatically determining
4 video segments having an output connected to the human operated module; and

5 a switch for choosing output from either the human operated module or the
6 automatic video segment determining module.

7 17. The video segment extractor of claim 16, further comprising:

8 a segment extractor connected to a second switch which routes video segments
9 to one of a plurality of storage units.

1 18. The video segment extractor of claim 17, wherein the automatic video segment
2 determining module further comprises a plurality of characteristic extractors each
3 receiving the video and outputting a signal associated with an attribute of the video.

1 19. The video segment extractor of claim 18, wherein the automatic video segment
2 determining module further comprises an analyzer, the analyzer receiving input from
3 each of the plurality of characteristic extractors, and the analyzer further outputting a
4 signal to the human operated module.

1 20. The video segment extractor of claim 19, wherein the human operated module
2 optionally provides the output of the analyzer to a human operator for assigning video
3 segments.

1 21. A video content locator for locating subsegments and regions of interest, the
2 locator comprising:

3 a video subsegment locator;

4 a plurality of characteristic circuits each receiving the video content and each
5 producing a characteristic output;

6 a manual location module receiving the video content and the characteristic
7 output from each of the plurality of characteristic circuits, wherein subsegments and
8 regions of interest are determined using the manual location module which produces a
9 control signal, wherein the control signal controls the subsegment locator.

1 22. The video content locator of claim 21, wherein the manual location module uses
2 the output from the plurality of characteristic circuits to determine subsegments and
3 regions of interest.

1 23. The video content locator of claim 22, further comprising:

2 an analyzer connected to outputs of each of the plurality of characteristic circuits,
3 the analyzer outputting a signal associated with a statistical analysis of the video content
4 to an interpreter and to the manual location module; and

5 a switch for switching between the statistical analysis signal from the analyzer and
6 a signal output from the manual location module.

1 24. The video content locator of claim 23, further comprising:

2 a plurality of region of interest locators each receiving via a switch an output
3 signal from the subsegments locator; and

4 a plurality of subsegment and region of interest index storage units each receiving
5 an output from one of the plurality of region of interest locators.

1 25. A video content locator for locating subsegments and regions of interest in multi-
2 media content, the video content locator comprising:

3 a video subsegment locator having an output signal;

4 an automatic analyzer for receiving video content and automatically making
5 characteristic determinations and subsegment divisions;

6 a manual operation module for manually making subsegment divisions, the
7 output signal from the automatic analyzer being input to the manual operation module;

8 a plurality of region of interest locators connected to the output signal of the
9 video subsegment locator; and

10 a plurality of subsegment and region of interest storage units, each unit
11 connected to an output of one of the region of plurality of interest locators, wherein a
12 control signal from the manual operation module controls the routing of the output of
13 the video subsegment locator to each of the plurality of region of interest locators.

1 26. A system for mapping video content models to video segments, the system
2 comprising:

3 a first video content descriptor storage unit;

4 a second video content descriptor storage unit;

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5 a first comparator that receives an output from the first video content descriptor
6 storage unit and receives a video segment, the comparator producing a first comparator
7 output signal;

8 a second comparator that receives output from the second video content
9 descriptor storage unit and receives a video segment, the comparator producing a second
10 comparator output signal; and

11 a selector that receives the first comparator output signal and the second
12 comparator output signals and produces a selector output signal representing a video
13 content segment associated with a model.

1 27. The system of claim 26, further comprising a buffer for storing the selector
2 output signal until the selector output signal is ready to be encoded.

1 28. An apparatus for encoding video content divided into segments, the apparatus
2 comprising:

3 a switch having an input receiving the video content and a plurality of outputs;

4 and

5 a plurality of encoders, each encoder of the plurality of encoders being connected
6 to an output of the plurality of switch outputs.

1 29. The apparatus of claim 28, wherein the switch is controlled to route each
2 segment to one of the plurality of segments based on a segment model.

1 30. The apparatus of claim 29, wherein each encoder of the plurality of encoders is
2 associated with a predetermined model.

1 31. The apparatus of claim 30, wherein an encoder of the plurality of encoders is a
2 generic encoder for encoding segments not associated with a predetermined model.

1 32. An apparatus for encoding video content divided into portions, the apparatus
2 comprising:

3 a switch having an input receiving the video content and a plurality of switch
4 outputs; and

5 a plurality of encoders, each encoder of the plurality of encoders being connected
6 to an output of the plurality of switch outputs, wherein each portion of video content is
7 routed to one of the plurality of encoders based on a content model associated with each
8 portion.

1 33. The apparatus of claim 32, wherein the portions of the video content are
2 segments.

1 34. The apparatus of claim 32, wherein the portions of the video content are regions
2 of interest.

1 35. The apparatus of claim 32, wherein the portions of the video content are
2 subsegments.

1 36. An apparatus for encoding video content, the video content divided into portions
2 with each portion associated with a content model, the apparatus comprising:

3 a generic encoder associated with a generic content model;

4 a plurality of encoders, each encoder of the plurality of encoders being associated
5 with a content model; and

6 a switch for routing the video content portions to either the generic encoder or
7 one of the plurality of encoders based on the model associated with each video content
8 portion.

1 37. The apparatus of claim 36, wherein the portions of the video content are
2 segments.

1 38. The apparatus of claim 36, wherein the portions of the video content are regions
2 of interest.

1 39. The apparatus of claim 36, wherein the portions of the video content are
2 subsegments.